

(RESEARCH ARTICLE)



## Education of nurses in rural primary health cares to improve vital care of newborns: A community-based research in Nigeria

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### Abstract

This study was designed to ascertain the level of knowledge and the degree of practice of the components of Essential New-born care (ENC), and the effects of a training programme on the knowledge and practice of ENC among nurses in rural Primary Health Cares (PHCs) in South East Nigeria. This study was a one group pre-test and post-test intervention design. The components of ENC considered were: New-Born Initiation of Breastfeeding, Thermoregulation, New-Born Cord Care, Newborn Eye Care, Initiation of Breathing and Administration of Vitamin K. A Neonatal care Knowledge and Practice Assessment (NCKPA) Questionnaire tested for validity and reliability, with a Spearman's correlation coefficient of 0.81, was used for data collection among the (96) available nurses (All female). There was significant improvement in the level of knowledge and extent of practice of the components of ENC following the training programme. Despite the improvement, there were gaps in knowledge and practice of the components of ENC amongst the nurses in rural PHCs and affected were the level of knowledge of Eye care 40(41.6%) - pre-intervention, and least knowledge of cord care 70 (72.9%) and eye care 90(93.8%) - post-intervention. Increase in knowledge corresponded with increase in good practice of ENC. The concern with knowledge transfer and translation of knowledge into practice could be achieved by pre-service and in-service education, update courses and workshops, and this will empower the nurses, getting them familiar with current trends and practices for improved child survival rate.

**Keywords:** Neonatal; Breastfeeding; Essential New-born care; Primary health cares

### 1. Introduction

The vulnerability period during which infants are prone to illness and death usually occurs within the first 28 days of birth [1]. It is on record that out of annual 10 million deaths of children under 5 years of age, 4 million occur during the neonatal period accounting for 40% of total deaths of children [2]. More so, nearly 99% of neonatal deaths happen in developing nations in Africa and South East Asia. High neonatal mortality rates (NMRs) always pose a severe challenge to developing countries especially sub-Saharan Africa due to poverty and lack of access to good Health care services [3]. In Nigeria, NMR is 48 per 1000 live births, whereas infant and under-five mortality rates are 100 and 210 per 1000 live

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births, respectively. Sadly, the causes of most neonatal deaths are highly preventable, especially in countries such as Nigeria [4].

Most of the neonatal deaths in developing countries are not recorded in formal vital registration systems; hence, data mostly reported in published literature and technical reports are estimates from national demographic surveys. Population-based studies about neonatal deaths in countries with high mortality rates are largely dependent on oral interrogative autopsy [5]. In Nigeria, available data on neonatal mortality are flimsy; most studies are institution based and very often retrospective in design.

Essential Newborn cares are those essential guidelines recommended by the WHO (2017) to reduce the risk of neonatal diseases and death. Essential Newborn care is rendered to newborn immediately at birth and within the first 24 hours after birth. They include hygiene during delivering, initiation of breathing, keeping new-born warm, early initiation of breast feeding, exclusive breast feeding, and care of the eyes, early identification of illness, immunization and care of low birth weight new-born [6]. Newborn care practices reduces the risk of neonatal deaths in both community and facility; a design that improves the health of new-born through interventions during prenatal, antenatal, intrapartum, at birth and immediately after birth, and in the postnatal period [7]. Newborn care has been in practice before now although the rationale for some of the practices could not be explained while others lack evidence base. Virtually all babies undergo the same process of care without considering the peculiarity of each and the benefit. Such procedures like turning babies head upside down to remove secretions, use of sodium bicarbonate for initiation of breathing, stimulating breathing by splashing cold water on neonate's body at birth have been routinely used indiscriminately [8].

Essential Newborn cares are neonatal interventions that can avert about 75% of neonatal deaths. The authors noted that initiation of breastfeeding within the first hour of birth, delay in bathing, cutting of cord with clean instruments and thermal care are very important practices that determine neonatal survival. More importantly, timely and correct intervention is required for child survival. NNC practices can be the immediate care at birth or the subsequent and follow up care a child needs. The immediate neonatal care practices (ENC) include the immediate care at birth that is aimed at addressing poor care practices immediately following birth. They include initiation of breathing and management of asphyxia, maintaining clean cord care, thermal care either by wrapping with baby's mat or skin to skin contact with the mother immediately after delivery, delaying of first birth for at least 24 hours, initiation of breastfeeding within an hour of birth and management of early sepsis [9]. The practice of NNC differs from level to level in different settings. Health institutions may decide to emphasize some and not all the components of NNC. Haji *et al.*, (2018) noted that giving birth at health facilities does not make immediate new-born care practice universal. They emphasized continuous training and monitoring for an acceptable neonatal practice. The level of practice of NNC can be determined by the experience and knowledge of the health workers and also the type of health facility. Thus, training emphasis on neonatal (new-born) care will contribute to improved neonatal care practices and the consequently expected decline in neonatal death. Primary health centres which are situated in the rural area gives primary level care services to the rural dwellers. Therefore, there is need for studies on the training and practice of newborn care amongst rural health workers [10].

While Southeast of Nigeria was reported to have highest neonatal mortality rate in 2020 by the WHO, in that same year, the Ministry of Health employed and deployed health workers including nurses to the rural healthcare facilities especially the Primary Health Centres (PHCs). This effort with quality training is expected to improve newborn care and reduce neonatal mortality in the state [11]. According to a report by the WHO on new-born care in Nigeria, there is lack of availability of Emergency Obstetric and New-born Care (EmONC) Services, while there are 1.6 nurses per 1000 population (UNICEF, 2023) which is inadequate [12].

The knowledge, attitude and practice theory proposed in 1960s by Western Scholars and used in this study states that exposure to knowledge tends towards formation of attitude that will lead to change in behaviour or the way of practice. Training of Nurses is expected to improve their knowledge and effectiveness of practice of ENC. Thus, this study aimed at evaluating and improving the level of knowledge and practice of ENC amongst nurses in the rural areas in Southeast of Nigeria.

In Southeastern Nigeria, the neonatal mortality rate is 30 per 1000 live births (National Bureau of statistics *et al.*, 2017), which is apparently high (WHO, 2020) [4]. This recent update of high neonatal mortality necessitates a research to explore the current situation; the knowledge and practice of ENC in the state, and the determined knowledge and practice will inform the need for an intervention, a training programme to update the nurses on the ENC, hence this study was designed.

While it is established that good neonatal care practices will improve neonatal mortality, there is inadequate knowledge and practice of all the components of neonatal care amongst health workers. The need for training and follow-up mentoring has been acknowledged and emphasised [13].

The purpose of the study was to determine the level of knowledge and the extent of practice of ENC among nurses working in Primary Health Centres (PHCs) in rural areas in Ebonyi State, and to evaluate the impact of a newborn care education (intervention) training programme on their

### 1.1. knowledge and practice of ENC

The specific objectives of the study are;

- To determine the level of knowledge of ENC before intervention, considering its following components:
  - Initiation of neonatal breathing
  - Thermoregulation
  - Initiation of neonatal cord care
  - Neonatal eye care
  - Early Initiation of breast feeding
  - Vitamin K administration
- To determine the extent of practice of the components of ENC before intervention.
- To determine the level of knowledge of ENC following an ENC training (intervention) programme.
- To determine the extent of practice of ENC following an ENC training (intervention) programme.
- To determine the relationship between the level knowledge and the extent of practice of the components of ENC.

### 1.2. Knowledge, Attitude and Practice (KAP) Theory

KAP is a health behaviour change theory proposed in 1960s by Western scholars. It originated from learning theory, Bandura (1976) and innovation theory, Rogers (1995). It is based on cognitive –affective –behaviour theory in social psychology. KAP has three concepts that are connected and are used to assess gaps when preparing for change endeavours. The three process of human behaviour change are acquiring knowledge, generating attitudes/beliefs and forming practice/behaviour that will lead to change in the concerned area (ie knowledge, attitude and practice domains).

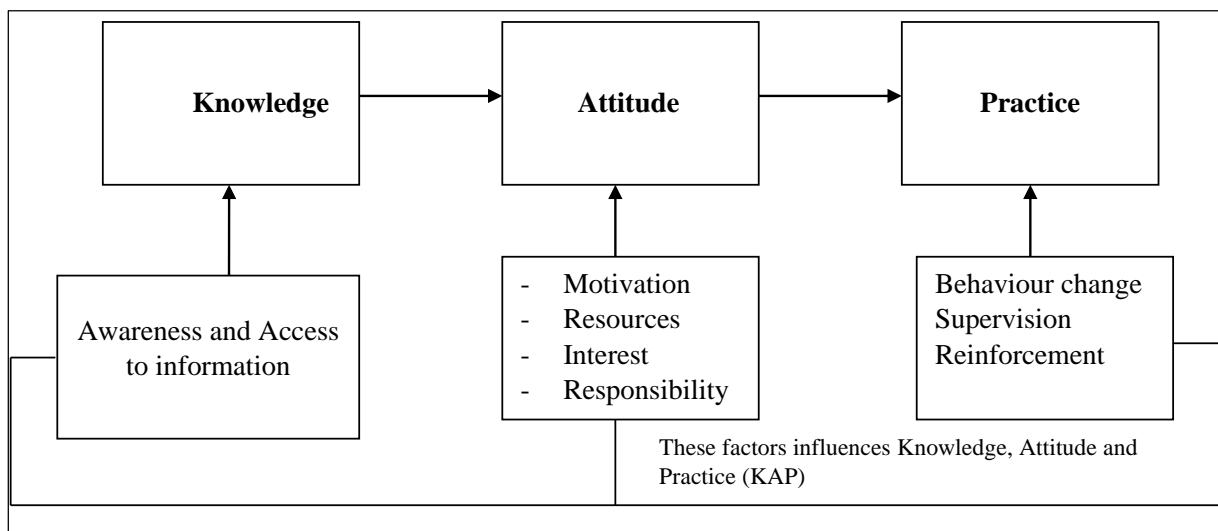
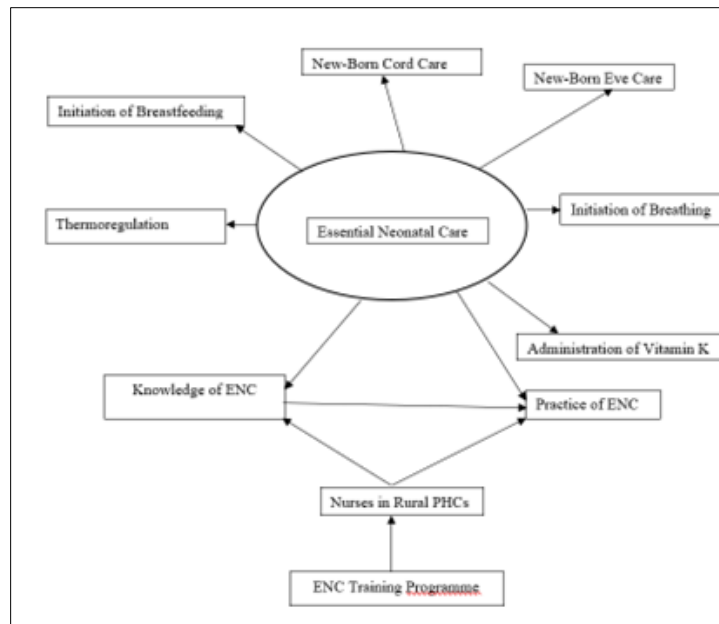


Figure 1 Diagram of KAP theory [14]

### 1.3. Conceptual Framework



**Figure 2** Conceptual Framework

### 1.4. Components of Essential Newborn Care

#### 1.4.1. Initiation of Breathing

. When a baby is not able to initiate respiration, resuscitation is done to prevent birth asphyxia and its complications. According to Alebel *et al.* (2020), about 4 million neonatal death occur annually worldwide. In preparing for birth, health workers make provision in anticipation for resuscitation at every birth since it is initiated without delay [15].

#### 1.4.2. Thermoregulation

Thermoregulation is the ability to balance heat production and heat loss in order to maintain body temperature within normal range. The neonate needs an adjustment of body temperature following birth due to the change of environment from birth up to 12hours. Thermoregulation is of concern especially to low birth weight (>1500g) and premature babies because it is life threatening. Heat loss result from baby's surface area, thin skin, less subcutaneous fat and loss brown fat. Heat loss results from conduction, convection, radiation and evaporation [16].

#### 1.4.3. Umbilical Cord Care

The umbilical cord connects the fetus to the mother, a source through which the fetus receives nutrients inutero. After birth the cord is cut two fingers away from the baby and clamped or tied with a clean suture. The cord is cared for daily by cleaning with sterile water and exposed to dry. Antiseptic lotion is used to clean cord in infected suspected area, and application of 7.1% chlorhexidine solution/gel until the umbilical stump dries up within five to fifteen days. Several studies have confirmed the susceptibility of bacterial colonization on the umbilical cord but the method of caring after birth affects bacterial colonization and time of cord separation [17].

#### 1.4.4. Eye care

About 40% of blindness and low vision are caused by ophthalmia neonatorum, use of traditional eye remedies, corneal scarring, vitamin A deficiency and cataract which in low income countries are avoidable. The author noted that little attention has been paid to eye care in the rural setting unlike the progress made in the tertiary institutions. The eyes are treated by cleaning the eyelids at birth with sterile wet swab and installation of topical silver nitrate solution or tetracycline ointment as prophylaxis within an hour of birth [18].

#### 1.4.5. Immunization

This is the process whereby a person is made immune or resistant to an infectious disease by introducing a vaccine into the body to stimulate the body's own immune system to protect the person against infection. It is a cost effective health plan that can avert 2-3 million deaths yearly.

#### 1.4.6. Early Initiation of Breastfeeding

Early initiation of breastfeeding within the first hour of birth, then exclusive breast feeding for 6 months of age continued with complementary feeds up to two years or beyond is the recommended standard according to World Health Organization (WHO, 2017). It is a cost effective means of protecting, promoting and supporting the child's health. The first milk a child takes (colostrum) improves its immunity. Breastfeeding is usually delayed by factors including caesarean birth, discarding initial breast milk, home delivery and mother being responsible for initiating breastfeeding [19].

#### 1.4.7. Administration of Vitamin K

Vitamin K is administered for prevention of haemorrhage in the first hour after birth. There is absence of gut flora (bacteriodes) and low prothrombin level at birth, exposing new-borns to increased risk for haemorrhage. A single injection of vitamin k 0.5gm to 1gm after birth protects a baby for some months. When oral route is used the term baby requires weekly administration of 1gm until 12weeks or 2mg at birth and then repeated at 1week of age and 4weeks of age. Preterm will have additional 2mg at 8weeks. Vitamin K 1 (Aqua MEPHYTON), a water soluble preparation for neonates is administered intramuscularly into the vastus lateralis muscle after birth [20].

#### 1.4.8. Knowledge of Newborn/Neonatal Care

Ngabonzima *et al.* (2021) noted that one of the ways to improve neonatal care knowledge is by providing refreshment training, equipping health facilities, ensuring the use of national guidelines and mentoring. Training enhances knowledge of newborn care and is therefore imperative as a lifesaving skill. Also, training of midwives in new-born care is effective in acquiring knowledge and skill [21].

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## 2. Method

### 2.1. Research Design

This study used a pre-test and a post-test intervention design. This is considered fit since this study focuses on the determination both dependent and independent variables. Here, dependent variables (knowledge and practice of ENC) and independent variable (ENC training programme are stimulated by the investigator) [22].

### 2.2. Area of Study

The study was carried out in rural areas of South Eastern States of Nigeria. This zone comprises of five States with a minimum population of 15 million.

### 2.3. Population for Study

This study focused on the nurses that work at the PHCs in the rural areas of South Eastern States of Nigeria. These nurses participate actively in the activities of the PHCs including obstetric care, maternal and child care, and are expected to be able to carry out ENC.

### 2.4. Sample Size

A sample size of one hundred and twenty-three (123) nurses working at the PHC's in the rural areas of South East Nigeria was mathematically calculated using power analysis formula. While in the field, ninety six (96) nurses who were available and willing to participate in the study were used for the study. The short fall in the number of nurses is as a result of retirement of some of the nurses from service and many were unwilling to participate.

### 2.5. Sampling Procedure

Samples were selected by purposive and convenience sampling method. Nurses were purposively selected from many health workers in the rural PHCs, and 96 nurses were conveniently selected from 28 PHCs in the zone.

## 2.6. Inclusion criteria

- Nurses that conduct at least ten (10) deliveries per month.
- Nurses working at the rural PHCs of the zone.
- Nurses who have been part of at least a perinatal and postnatal service in the PHC.
- Nurses who were willing and able to participate in the study.
- Nurses who are mentally fit.

## 2.7. Instrument for Data Collection

The instrument for data collection was a modified questionnaire on the knowledge and practice of ENC, adopted from the United State Agency for International Development (USAID) knowledge and practice checklist on newborn care (USAID Integrated Health Program, Nigeria, 2018). Thus, a Newborn care Knowledge and Practice Assessment Questionnaire (NCKPAQ) was used for the pre-test and post-test. The questionnaire consists of three sections A, B and C. Section A contains four items for the characteristics of the nurses. Section B contains 26 items (multiple choice questions) on the level of knowledge of newborn care. Section C contains 32 items (3 level likert scale of “always, some times and never”) on the extent of practice of neonatal care among the nurses [23].

## 2.8. Reliability of Instrument

The reliability of the instrument was established using the test-retest method. 10 copies of the questionnaire which is approximately 20% of the sample size were administered to nurses in the rural PHC's in Enugu State. After two weeks of first administration, the researcher administered the second questionnaire to the same group. The result of both tests were collected and compared. The Spearman Co-relation coefficient was used to correlate the scores because it measure relationship between two variables especially for a non-parametric function when likert scale is used. Reliability coefficient of 0.81 was achieved. This showed a high reliability index that made it usable for collection of data in the different phases of the study.

## 2.9. Ethical Consideration

This current research work was done after a permission to go ahead was granted from the ethical committee of the Ebonyi State University, Abakaliki Nigeria with registration EBSU/DRIC/UREC/Vol.06/012

## 2.10. Method of Data Collection

Following ethical approval from the authorities, the purpose of the study was thoroughly explained to the subjects. Their questions regarding the study were answered, and their oral consent for participation was obtained six (6) final year nursing students from different universities were engaged as research assistants. They were trained and instructed on the method of collecting data and their roles during intervention programme. The perceived familiarities of the students with maternal and new-born care informed their involvement in the study as research assistants

## 2.11. Method of Data Analysis

The analysis was simply intended to determine and give a picture of the situation of the knowledge and practice of ENC among the nurses as a group among the health workers in the PHCs. Data obtained was analyzed by descriptive statistics (frequency and percentages) to determine the situation pre-and post-tests, using the Statistical Packages for Social Sciences (SPSS) version 25. The inferential statistics of Pearson correlation and chi-square with p-value set at 0.05 was used to test the hypothesis. The decision rule for hypothesis testing were that probability (significant) value greater than the set p-value deemed the hypothesis accepted, and vice versa.

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## 3. Results

Table 1 below shows the characteristics of the nurses working in the PHCs in the rural areas of Southeast, Nigeria. They were all 96 female nurses. There was no male nurse in the PHCs.

Considering their years of practice, 54 (56.25%) nurses had practiced for about 1 to 10 years, 32 (33.33%) nurses had practiced for about 11 to 20 years while only 10 (10.42) nurses has practiced for more than 21 years. For the number of raining, majority 58 (60.4%) of the nurses had training on ENC once while 10 (10.4%) never went for training. Considering the last year of training, only 24 (25%) had ENC training in the last 1 – 2 years while 10 (27.1%) had last training from 5 years and above.

**Table 1** Characteristics of the Study Subjects

Variable	Number (n)	Percent (%)
Gender		
Male	0	0
Female	96	100
Years of Practice		
1 – 10 years	54	56.25
11 – 20 years	32	33.33
≥21	10	10.42
Number of Trainings		
Nil	10	10.4
1	58	60.4
2	28	29.2
≥3	0	0
Last year of Training		
Nil	10	10.4
1 – 2	24	25
3 – 4	36	37.5
≥ 5	26	27.1

Researcher's field work, 2023

**Table 2** Knowledge of the Components of ENC among the nurses; pre-and post-interventions

		Variables	Pre-Intervention (%)	Post-Intervention (%)
1	Neonatal/Essential New-Born Care	What is neonatal care?	62(64.6)	96(100)
		Duration of neonatal period	76(79.2)	96(100)
		Immediate Essential New-Born Care services rendered to neonates	96 (100)	96(100)
		An alert sign of early infection	70(72.9)	92(95.8)
2	New-Born Eye Care	Reason a child should receive eye care at birth	40(41.6)	90(93.8)
		The type of eye treatment recommended at birth	24(25)	94(97.1)
		Signs of eye infection	50(52.1)	92(95.8)
3	New-Born Breathing	A newborn is supposed to initiate breathing within	24(25)	96(100)
		First breathing can be stimulated by	70(72.9)	94(97.1)
		The initial neonatal respiration is	72(37.5)	96(100)
		A New-born that cannot initiate respiration requires	76(79.2)	94(97.1)

		Time to initiate intervention after breathing fails to start after birth in neonates	84(87.5)	96(100)
		One of the complications of resuscitation	30(31.25)	96(100)
4	Vitamin K Administration	Time for initiation of Vitamin K administration	56(58.3)	94(97.1)
		The recommended dosage of Vitamin K for newborn	52(54.2)	90(93.8)
		The route of Vitamin K administration in newborn	80(83.3)	96(100)
		Reason for Vitamin K administration in newborn	80(83.3)	96(100)
5	Cord care	How often is the cord cared for daily	84(87.5)	96(100)
		Substance used for cleaning umbilical stump	72(64.6)	94(97.1)
		The WHO recommended application on umbilical stump	20(20.8)	70(72.9)
		How umbilical cord is handled, covered or close?	70(72.9)	90(93.8)
		How long do you wait before clamping the cord at birth	80(83.3)	96(100)
6	Breast feeding	Time of initiation of exclusive breastfeeding	90(93.8)	96(100)
		The function of the first breast milk a child takes	94(97.1)	96(100)
7	Thermoregulation	How soon after birth is newborn dried up?	96(100)	96(100)
		How long after delivery do you give newborn first bath?	60(62.5)	96(100)

Researcher's field work, 2023; **Note:** This table only showed those that were correct about the components of ENC.

Table 2 showed knowledge of the nurses on the selected component of ENC. The figures present the number of nurses that are knowledgeable of the corresponding components of the ENC.

However, for Pre-intervention (results)

- Item statement 1 – Neonatal Care/Essential New-born Care, all the respondents knew that essential new-born care services are rendered to new-born, while 34(35.4%), 26(27.1%), 20(20.8%) respondents were not aware that neonate care is for all new-born, seems not knowledgeable about alert signs of early infection, and did not know the duration of neonatal period, respectively.
- For item 2 –New-born eye care; 56(58.3%), 72(75%), and 46(47.9%) respondents did not know reason a child should receive eye care at birth, the type of eye treatment recommended at birth and signs of eye infection, respectively.
- For item 3 –New-Born Breathing; 72(75%), 26(27.1%), 60(62.5%), 20(20.8%), 12(12.5%), 66(68.8%) respondents got it wrong about time within which new-born is supposed to initiate and sustain breathing, how to stimulate first breathing, did not know that initial neonatal respiration is shallow and irregular, that a neonate that cannot initiate respiration requires resuscitation, the time to initiate intervention after breathing fails to start after birth in new-born, and one of the complications of resuscitation, respectively.
- Item statement 4 - Vitamin K Administration; 40(41.7%), 44(45.8%), 16(16.7%), 16(16.7%) respondents got it wrong about the time for initiation of Vitamin K administration, the recommended dosage of Vitamin K for new-born, the route of Vitamin K administration in new-born, and the reason for Vitamin K administration in new-born, respectively.
- Item statement 5 - Cord Care, 12(12.5%), 34(34.4%), 76(79.2%), 26(27.1%), 16(16.7%) respondents got it wrong about how often the cord is cared for daily, substance used for cleaning umbilical stump, the WHO recommended application on umbilical stump, how umbilical cord is handled, covered or close?, and how long to wait before clamping the cord at birth, respectively.
- Item Statement 6 - Breast Feeding, 6(6.3%) and 2(2.1%) respondents got it wrong about time of initiation of exclusive breastfeeding and the function of the first breast milk a new-born takes.
- Item statement 7 – Thermoregulation: all the respondents knew how soon after birth that a new-born is dried up, while 18 respondents did not know how long after delivery that a new-born should be given first bath.



### 3.1. Post-intervention (results)

All the nurses became knowledgeable of the components of ENC, except 3(6.3%), 1(2.1%), 2, 2(2.1%), 2(2.1%), 2(2.1%), 6(6.3%), 2(2.1%), 26(27.1%), 6(6.3%) respondents who need improvement in knowledge, specifically on the reason a child should receive eye care at birth, the type of eye treatment recommended at birth, signs of eye infection, how first breathing can be stimulated, what could be done to a new-born that cannot initiate respiration, the time for initiation of Vitamin K administration, the recommended dosage of Vitamin K for new-born, substances used for cleaning umbilical stump, the WHO recommended application on umbilical stump, and how umbilical cord is handled, covered or close?, respectively.

**Table 3** Distribution of knowledge regarding New-Born care in the rural PHCs in onyi state

S/N	Components	Pre-Intervention (%)	Post-Intervention (%)
1	Neonatal/Essential New-born Care	76(79.2)	95 (98.9)
2	New-Born Eye Care	38 (39.6)	92(95.8)
3	New-Born Breathing	53.4 (55.6)	95.4 (99.4)
4	Vitamin K Administration	67(69.8)	94(97.1)
5	Cord care	63.2(65.8)	93.2(92.9)
6	Breast feeding	92(95.8)	96 (100)
7	Thermoregulation	78(81.3)	96(100)

Researcher's field work, 2023

Table 3 shows that the knowledge regarding new-born care was classified into two categories namely adequate/good knowledge ( $\geq 50\%$ ) and inadequate/poor knowledge ( $< 50\%$ ). The findings of the study revealed that the knowledge for component 1, 3, 4,5,6,7 were good whereas item 2 showed poor knowledge in the pre intervention stage.

**Table 4** Chi-square summary on the effects of the intervention (education programme) on the knowledge of ENC amongst the Nurses

VARIABLES	VALUE	SIGNIFICANCE
Neonatal/Essential New-Born Care		
What is neonatal care?	133.16	0.001*
Duration of neonatal period	70.28	0.001*
Immediate Essential New-Born Care services rendered to neonates	86.7	0.001*
An alert sign of early infection	78.19	0.006*
New-Born Eye Care		
Reason a child should receive eye care at birth	87.38	0.001*
The type of eye treatment recommended at birth	104.06	0.001*
Signs of eye infection	84.05	0.001*
New-Born Breathing		
A newborn is supposed to initiate breathing within	104.77	0.001*
First breathing can be stimulated by	85.5	0.001*
The initial neonatal respiration is	126.61	0.001*
A New-born that cannot initiate respiration requires	138.00	0.001*
Time to initiate intervention after breathing fails to start after birth in neonates	104.13	0.001*

One of the complications of resuscitation	137.29	0.001*
Vitamin K Administration		
Time for initiation of Vitamin K administration	91.36	0.001*
The recommended dosage of Vitamin K for newborn	132.58	0.001*
The route of Vitamin K administration in newborn	92.86	0.001*
Reason for Vitamin K administration in newborn	84.26	0.001*
Cord care		
How often is the cord cared for daily	89.33	0.001*
Substance used for cleaning umbilical stump	112.92	0.001*
The WHO recommended application on umbilical stump	79.38	0.001*
How umbilical cord is handled, covered or close?	80.47	0.001*
How long do you wait before clamping the cord at birth	97.23	0.001*
Time of initiation of exclusive breastfeeding	89.33	0.001*
The function of the first breast milk a child takes	112.92	0.001*
Breast feeding		
Time of initiation of exclusive breastfeeding	125.73	0.001*
The function of the first breast milk a child takes	111.20	0.001*
Thermoregulation		
How soon after birth is newborn dried up?	106.93	0.001*
How long after delivery do you give newborn first bath?	88.45	0.001*

P-value is significant at  $p < 0.05$ . Keys: N= 96;  $X^2$  = Pearson's Chi-square, % = percent. \* = significant at  $p < 0.05$ ; Researcher's field work, 2023

From Table 4, the Pearson chi-square and the p-value showed that amongst the Nurses working in the PHC in the rural areas of Southeast, there was significant improvement in the knowledge of ENC following the ENC Education Programme.

#### 4. Discussion

This study was conducted using 96 nurses (all females) who were working at rural PHCs in South-East of Nigeria. Majority of the nurses (54) were in their 1-10 years of nursing practice. More than half of the nurses 58 (60.4%) have received training on ENC at least once and less than half had training in the past 2 years. This study assessed the pre-intervention knowledge and practice of the components of ENC amongst the nurses. It also assessed the post intervention knowledge and practice of rural PHC nurses following ENC training programme and the relationship between the knowledge and practice.

This study revealed prior to the administration of the intervention, a dearth of knowledge of ENC amongst the nurses. In other words, all aspects of the ENC was affected. Nevertheless, the nurses have very significant knowledge of neonatal/new-born care' (with concerns about cord clamping and umbilical cord cleaning) and 'thermoregulation (bathing baby within 1<sup>st</sup> hours birth and delivery in warm room)', though all items of other components suffered limited knowledge amongst the nurses. There was remarkably limited knowledge of 'Initiation of breathing' and 'Vitamin K administration (time for initiation and dosage)' and 'Eye care' amongst the nurses, pre-intervention

Based on the result of this study, up to half of the total number of the nurses have no good knowledge of Eye, cord and breathing care of the ENC. They (58.3%) did not know the reason a child should receive eye care at birth and the type of eye treatment recommended at birth; did not know the time within which a new-born should initiate and sustain breathing (75%), that a neonate that cannot initiate respiration requires resuscitation (62.5%) and the complications of resuscitation (68.8%); did not know of the WHO recommended application on umbilical stump (79.2%). Following post intervention, there was improvement in the nurse's knowledge of some of the components of ENC. The marked

increase in knowledge immediately post intervention is in line with Briggs et al. (2021) who reported increase in knowledge of resuscitation immediately post intervention. There was least knowledge on recommended application on the umbilical stump 70 (72.8%). This may result from the cultural belief and influence from the community members on the nurses. Overall, there is limited knowledge of the components of ENC amongst the nurses. By implication, good knowledge of ENC would reduce new-born death in Nigeria (Arba and Zana, 2020).

In this study before ENC intervention, there were good practices by all the nurses about 'Initiation of breastfeeding of the new-born within 1<sup>st</sup> hours after birth, insisting on giving baby 1<sup>st</sup> breast milk (colostrum), do not give artificial milk at birth and they supervise initial breastfeeding of babies'. This may be because they practice those ENC components always. These good practices are about 66.7% of the items of the component, 'Initiation of breastfeeding'. Giving water at birth and exclusive breastfeeding was observed to be emphasized at times, but following the training the right approaches were observed amongst the nurses.

The observed good practices by the nurses on thermoregulation prior to intervention were delivering the babies on a mat on mother's abdomen, drying baby after delivery, allowing skin to skin contact to prevent babies from cold, did not bathing the babies within first day of birth, and separate baby from mother. The nurses had good practice of all the items of thermoregulations except delivering of babies in warm room, even after post-intervention. Majority of the nurses deliver babies in rooms not described as 'warm', though there was slight inconsistency in practice (16.67%), post intervention. The problem with room temperature require urgent intervention to curb the prevalence of thermoregulation related issues like hypothermia (2–4 °C drop in new-born temperature in the first 10–20 minutes of life through convection and evaporation), cold injury, blood gas tension.

The only good practice of the new-born cord care by the nurses were that they cut the cord with sterile blade or scissors and had the umbilical stump clean on daily basis, out of the seven items of the ENC component, pre-and post-intervention.

New-born eye care and administration of vitamin K suffer the least practices of the components of ENC; a few nurses were observed to be practicing the items of the components.

Overall, while majority of the nurses seems to practice good ENC [23]. There is need to improve the practice of the components of ENC amongst the nurses working in rural PHCs in South East of Nigeria, and this could predispose new-born to high risk of mortality and morbidity [24].

The pre-intervention study showed poor level of knowledge and practice in most of the items of ENC components especially on newborn eye care, initiation of breastfeeding and administration of vitamin K. This may be as a result of loss of knowledge with time. The study is in line with Amsalu *et al.*, (2020) who noted a low level of neonatal care knowledge and practice among nurses and midwives in Ethiopia. The post-intervention study showed that improved knowledge of ENC will cause improved practices [25].

However, it was observed that improved knowledge caused improved practices. The improvement was a proof that educational intervention program is needful for improving knowledge and practice of health nurses.

Before the intervention, all the nurses ensured usage of sterile and neat equipment for cutting the cord. This is not comparable with the unhealthy practice of cord cutting with knife, sickle and dirty mats, floor and banana leaves in Nepal and Bangladesh [26].

Only 24 (25%) nurses knew how to treat new-born eye issues. Application of breast milk to the eye for treatment of conjunctivitis is deemed inappropriate [27]. The overall response on good practice of neonatal eye care among the health workers (nurses) improved significantly after training when compared to before training in each case, post-intervention. There was significant improvement in the components of the initiation of breathing amongst the nurses.

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## 5. Conclusion

The study has demonstrated that the Nurses from the rural PHCs significantly improved their knowledge and practice on essential new-born care after participating in the intervention/training course. While there was improvement in each of the considered components of ENC, there was need for further improvement on the components. The most affected of the components were eye care, administration of Vitamin K, and thermoregulation, and the situation is perceived to be due to poor supplies of resources/working materials and poor physical structure (building). Nevertheless, since it is proved that such training will improve ENC practices, there is need for intermittent update

meeting with rural health workers (nurses) in order to refresh their minds on the expected responsibilities and current trends. Literature reviewed for this study revealed that local concerns with knowledge and practice of the components of ENC are also a continental concern since many African countries were affected.

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## Compliance with ethical standards

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The authors declare absence of conflict of interest in caring out this research work both internally and externally.

### *Disclosure of Ethical clearance*

This current research work was done after a permission to go ahead was granted from the ethical committee of the Ebonyi State University, Abakaliki Nigeria with registration EBSU/DRIC/UREC/Vol.06/012

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